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UDK 598.252.1:574.3(497.5)
DOI 10.21857/mnlqgcpk0y

Original scientific paper
Izvorni znanstveni članak
Received: 20.7.2026.
Accepted: 9.10.2026.

POPULATION TRENDS OF WINTERING GEESE IN CROATIA

Populacijski trendovi zimujućih gusaka u Hrvatskoj

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ABSTRACT

Out of 11 geese species observed in Croatia (8 wild and 3 escaped) only two of them regularly winter: Greylag Goose *Anser anser* and Greater White-fronted Goose *Anser albifrons*. Based on data from International Waterbird Census (1999-2025), both species have an increasing trend in wintering numbers. Their main wintering areas are situated in the northern, Pannonian part of Croatia. Greylag Goose winters in an average of 9,502 (min = 1994, max = 34,116) and Greater White-fronted Goose winters in an average of 10,404 (min = 324, max = 30,959) individuals, respectively. Bean Goose (*Anser fabalis*) was a regular wintering bird in Croatia until 2017 (min = 11, max = 16,679, but up to 30,000 in 1988/1989), but the decrease of their population already started at the end of the 20th century as a consequence of a shift of their wintering habitats further north. In the past, the Red-breasted Goose *Branta ruficollis* was a very rare winter visitor, but since 2012 started to winter almost regularly in small numbers. Lesser White-fronted Goose *Anser erythropus*, Pink-footed Goose *A. brachyrhyncus*, Barnacle Goose *Branta leucopsis*, and Brent Goose *Branta bernicla* are very rare winter visitors in Croatia, usually in small numbers. Bar-headed Goose *Anser indicus*, Canada Goose *Branta canadensis*, and Egyptian Goose *Alopochen aegyptiaca* are considered non-native and escaped birds that are occasionally recorded in small numbers. The main wintering sites for geese are situated in northern Croatia along the Danube, Sava, and Drava rivers and their floodplains, as well as on large fishponds that provide shelter, from where they fly out to the foraging areas on nearby agricultural fields. Mediterranean part has completely lost its relevance for wintering geese due to global warming and consequently

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milder winters in the northern parts of Croatia, the Pannonian plain, and Central Europe.

Keywords: *Anser*, *Branta*, *Alopochen*, key sites, breeding

INTRODUCTION

Geese species recorded in Croatia are represented by 11 species in total, belonging to three genera: *Anser, Branta,* and *Alopochen*. Eight of these are native to the Palearctic fauna: Greylag Goose *Anser anser*, Bean Goose *A. fabalis*, Pink-footed Goose *A. brachyrhyncus*, Greater White-fronted Goose *A. albifrons*, Lesser White-fronted Goose *A. erythropus*, Barnacle Goose *Branta leucopsis*, Brent Goose *B. bernicla* and Red-breasted Goose *B. ruficollis*. Three species are non-native and escapees from captivity or from established flocks introduced by man: Bar-headed Goose *Anser indicus,* Canada Goose *Branta canadensis* and Egyptian Goose *Alopochen aegyptiaca* (Tomik & Barišić 2024). A comprehensive review of their status in the former Yugoslavia, including Croatia, was given during early 1980s (Mikuska & Kutuzović 1982), with the note that the three non-native species were not yet observed at that time. Statuses of native species were further revised and updated during the 1995-1999 period (Madsen *et al.* 1999). Assessment of threat status was given in 2003 for Greylag Goose (Radović *et al*. 2003) and revised in 2013 (Tutiš *et al*. 2013) when populations of regularly wintering species were assessed, too.

In this article, we are presenting the data on wintering populations of geese and their trends in the 21st century.

MATERIAL AND METHODS

Data presented on wintering populations of geese in Croatia originate from the International Waterbird Census (IWC) conducted annually in mid-January. Croatia participated in the IWC since its beginning in 1967, but until 1987 it was primarily organised on a single site – Kopački rit Special Reserve. Since 1987, with the establishment of the first NGOs dedicated to bird protection and influx of new birdwatchers, this scheme expanded and results from 1987-1990 censuses were published (Mikuska & Mikuska 1992-1995). During the period 1991-1997, IWC was largely incomplete due to the outbreak of the war and inaccessibility of large parts of the area. Since 1997, it continued with proper coverage and results were partly published (Novoselac 2011, Rakitić 2020). However, full set of data is available at IWC web portal (https://iwc.wetlands.org/index.php/). For the purpose of this study and trend analyses, we used IWC data from the period 1999-2025 because the coverage of the area was good enough to obtain reliable data on wintering geese populations.

RESULTS AND DISCUSSION

Greylag Goose *Anser anser*

This is the only goose species regularly nesting in Croatia. During the period 1967-1972, it nested on a single site in north-east Croatia – Kopački rit wetlands along the Danube River – with an estimated population of 20-40 pairs (Mikuska 1973). With the increase of the breeding population in the Pannonian plain, the breeding population in Croatia followed this trend and increased from 20-100 pairs in the 1990s to 515 pairs in 2001 (Radović *et al*. 2003). It also increased its breeding range when it started to breed (15 pairs) on Jasinje fishponds along the Sava River since 2001 (Radović *et al*. 2003). In the next decade, the population was estimated to be 170-200 pairs, with further increase of breeding areas in the west direction and establishment of new nesting sites in oxbows (e.g., Topoljski Dunavac) and fishponds (Grudnjak, Donji Miholjac, Našice, Vrbovljani) (Tutiš *et al*. 2013). As a consequence of this increase, its conservation status was improved from Endangered to Vulnerable (Tutiš *et al*. 2013). The recent breeding population is estimated to 225-297 pairs that are breeding in northern Croatia bounded by the Drava, Sava and Danube rivers (Kapelj *et al*. 2023). Out of that number, more than half of the national population breeds on fishponds (Kapelj *et al*. 2023).

The wintering population underwent a similar increase during the past 50 years. While in the 1970s Greylag geese were barely present, in the late 1980s their numbers varied from 200-1100 individuals, depending on the severity of winter (Mikuska & Mikuska 1992-1995). In the past two decades, their wintering numbers have been increasing, reaching up to 34,000 individuals (average = 9502, min = 1994, max = 34,116 individuals, respectively) (Fig. 1).

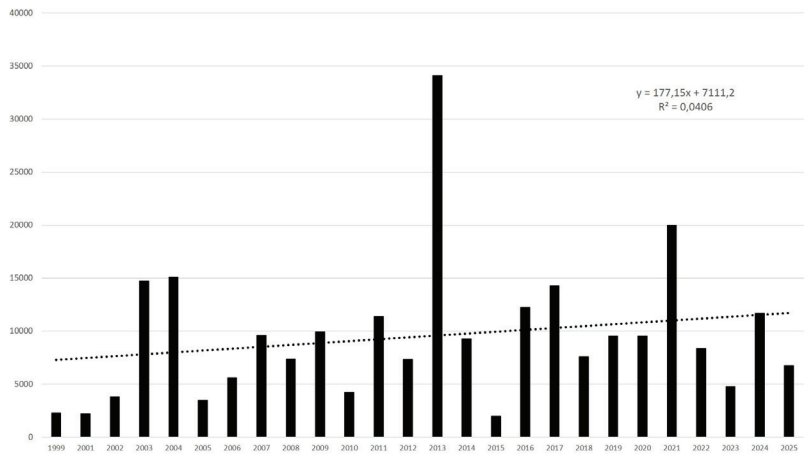


Figure 1. Numbers and trend of Greylag Goose *Anser anser* wintering population in Croatia
Slika 1. *Brojnost i trend zimujuće populacije sive guske Anser anser u Hrvatskoj*

Their main wintering areas are situated along the Danube (Kopački rit Nature Park, Topoljski dunavac oxbow), Sava (Lonjsko polje Nature Park, Jasinje fishponds, Pakra reservoir) and Drava rivers (Donja Dubrava reservoir), as well as fishponds in northern Croatia (Donji Miholjac, Našice, Grudnjak, Jasinje and Vrbovljani) (Fig. 2). With the global climate change, and consequently less severe winters, wintering sites in the Mediterranean parts of Croatia lost their importance for wintering geese, and nowadays they are wintering only sporadically, individually or in small flocks (less than 40 individuals).

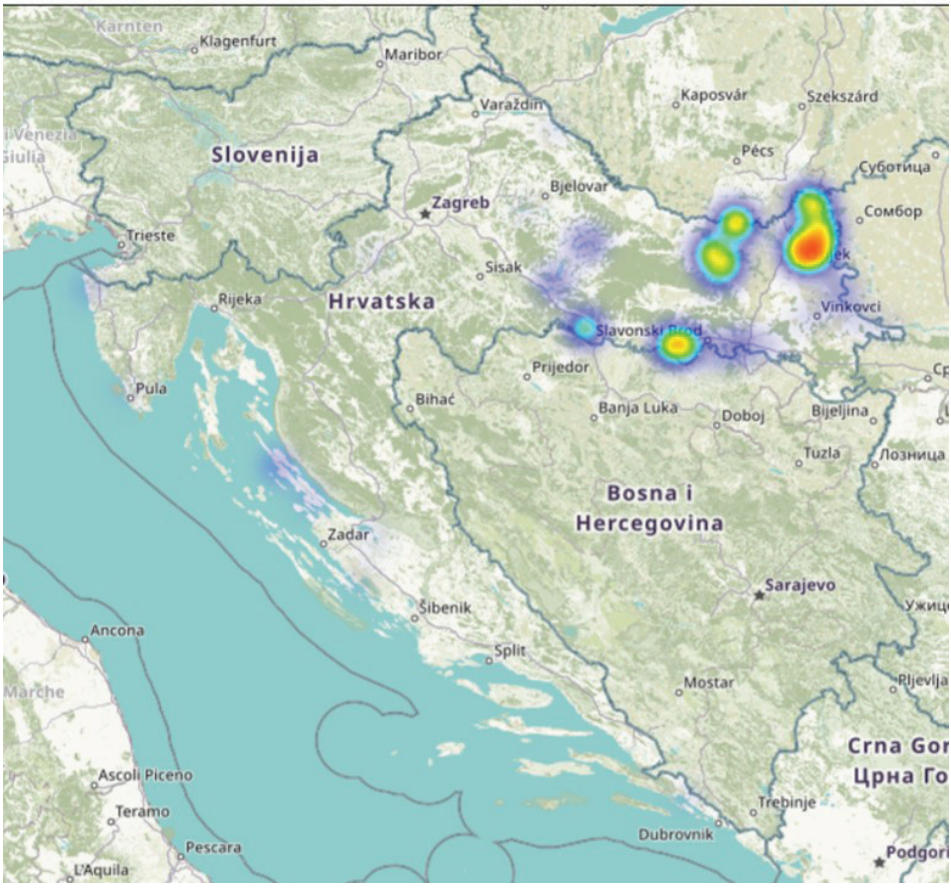


Figure 2. Main wintering areas of Greylag Goose *Anser anser* in Croatia (source: https://croatia.observation.org/)

Slika 2. *Glavna zimovališta sive guske Anser anser u Hrvatskoj (izvor: https://croatia.observation.org/)*

Greater White-fronted Goose *Anser albifrons*

This is the only regularly wintering species among non-breeding goose species in Croatia. During the late 1970s it was the most numerous migrant and winter guest in former Yugoslavia, mostly distributed in eastern parts of the country, nowadays Serbia, Montenegro and North Macedonia (Mikuska & Kutuzović 1982). In Croatia, the main staging area was in Kopački rit wetlands where they were most numerous (10,000-18,000 individuals) during the start of spring migration (Mikuska & Kutuzović 1982), while January peak numbers averaged at only 1,750 individuals (Madsen *et al*. 1999). From 1987-1990 their numbers during January varied between 115-4000 (average = 1276) individuals (Mikuska & Mikuska 1992-1995). Since 1999, there has been a steady increase in their wintering numbers, particularly after 2013 (Fig. 3). During this period, Greater White-fronted Goose wintered at an average of 10,404 (min = 324, max = 30,959) individuals.

Very similar to Greylag Goose, main wintering areas of Greater White-fronted Goose are situated along the Danube (Kopački rit Nature Park and surrounding fields, north Baranja with Topoljski dunavac oxbow), Sava (Jelas polje, Lonjsko polje Nature Park, Pakra reservoir) and Drava rivers (Donja Dubrava reservoir), as well as fishponds in northern Croatia (Našice, Grudnjak, Jasinje, Pakračka poljana) (Fig. 4). Wintering in the Mediterranean area is irregular and in small numbers (less than 10 individuals).

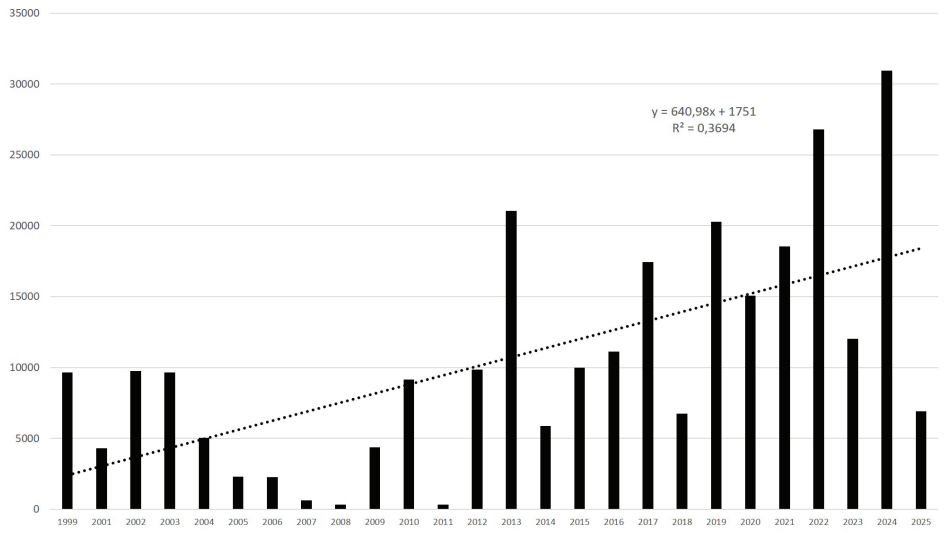


Figure 3. Numbers and trend of Greater White-fronted Goose *Anser albifrons* wintering population in Croatia

Slika 3. *Brojnost i trend zimujuće populacije lisaste guske Anser albifrons u Hrvatskoj*

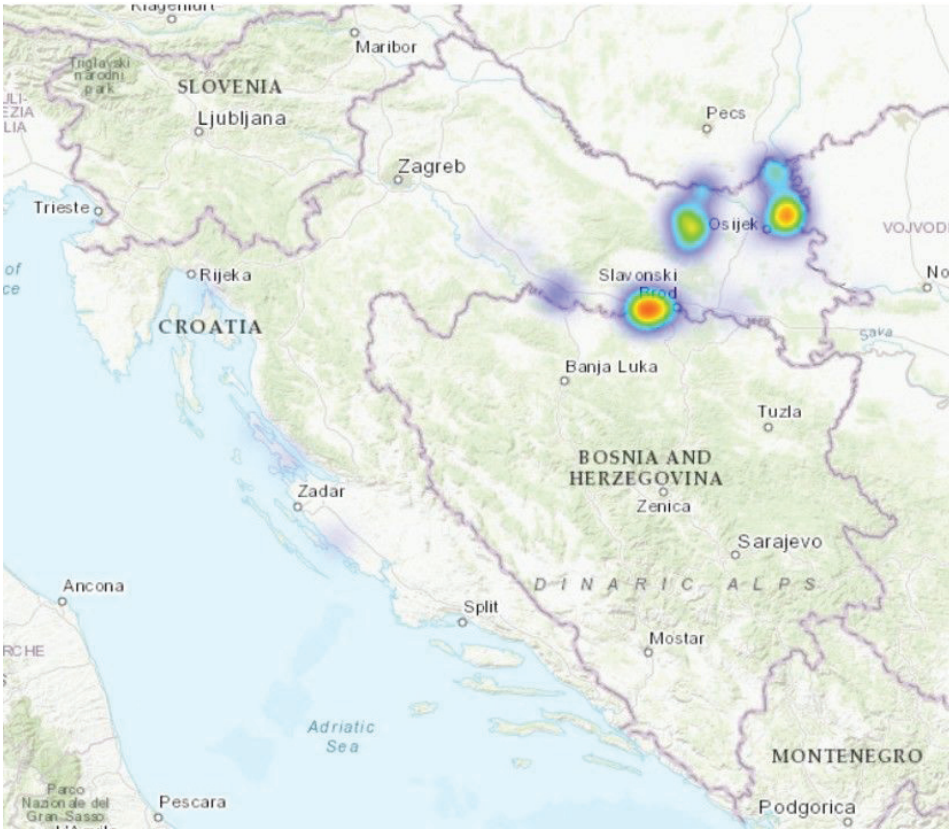


Figure 4. Main wintering areas of Greater White-fronted Goose *Anser albifrons* in Croatia (source: https://croatia.observation.org/)

Slika 4. *Glavna zimovališta lisaste guske Anser albifrons u Hrvatskoj (izvor: https://croatia.observation.org/)*

Bean Goose *Anser fabalis*

It was a regular wintering species in the 20th century with a population that exceeded 10,000-50,000 individuals, as in Kopački rit wetlands during the 1970s and 1980s (Mikuska & Kutuzović 1982, Lebret 1982). Based on the shot individuals, the presence of both races (Taiga Bean Goose *Anser fabalis fabalis;* and Tundra Bean Goose *A. f. rossicus*) was recorded (Keve & Mikuska 1973), with Tundra Bean Goose most likely to be dominant (Madsen *et a*l. 1999). From 1987-1990 they were still numerous, with up to 30,000 individuals counted in January (average = 15,957 individuals) (Mikuska & Mikuska 1992-1995). However, due to the major switch in the wintering areas from the Pannonian plain north toward Central Europe, that already started in the late 1980s and continued through 1990s (Madsen

et al. 1999), the Bean Goose wintering population strongly decreased during the beginning of the 21st century in Croatia and most of the Pannonian plain (Fig. 5). In the period 1999-2017, the Bean geese wintered at an average of 2380 (min = 11, max = 16,679) individuals.

Since 2018, it has become an irregular and rare wintering species in Croatia that could be observed in small numbers within mixed flocks of Greater White-fronted and Greylag geese.

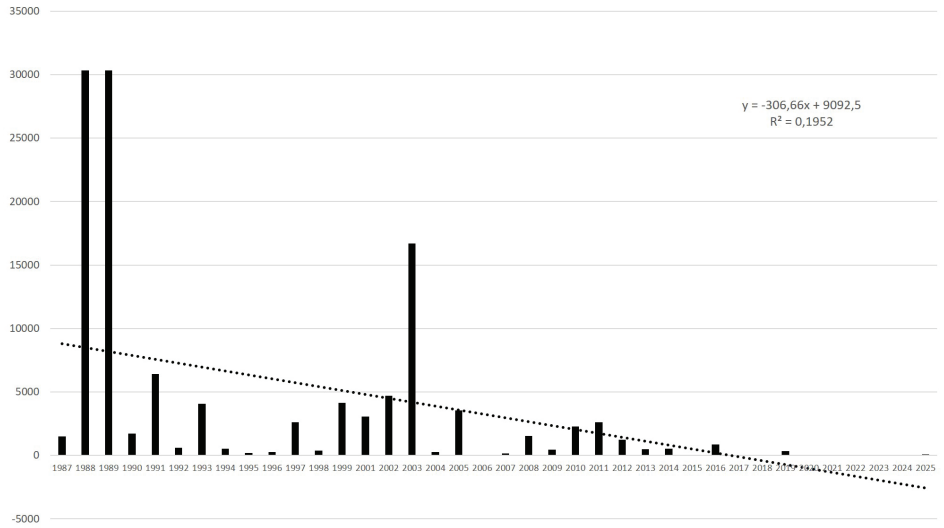


Figure 5. Numbers and trend of Bean Goose *Anser fabalis* wintering population in Croatia
Slika 5. *Brojnost i trend zimujuće populacije guske glogovnjače Anser fabalis u Hrvatskoj*

Red-breasted Goose *Branta ruficollis*

It was a rare and accidental wintering species in former Yugoslavia with 13 shot individuals during the 1929-1962 period (Mikuska & Kutuzović 1982). Out of that number, six birds were shot in Croatia, primarily along the Adriatic coast. By 2014, there were 11 records with a total of 37 individuals observed in Croatia (Barišić *et al*. 2016). However, since 2017, Red-breasted Goose has regularly wintered in small numbers in Croatia (min = 1, max = 11 individuals) together with Greater White-fronted Goose (Tomik & Barišić 2024) (Fig. 6). In this period, there are 13 observations, primarily in north-east Croatia (Kopački rit wetlands and Baranya region, up to 11 individuals), east Croatia (Našice fishponds, 3 individuals; Jasinje fishponds, 2 individuals), north-west Croatia along the Drava River (Donja Dubrava reservoir, 1-3 individuals) and central Croatia (Končanica fishponds and Banova Jaruga reservoir, single individual) (Tomik & Barišić 2024).

The main wintering areas of Red-breasted Goose are situated along the Black Sea from Bulgaria and Romania to Ukraine, including Danube delta (Madsen *et al*. 1999). Thus, wintering of this species in the Pannonian plain most likely could be attributed to individual birds and small family flocks that would join migrating Greater White-fronted Goose and accidentally end up there, rather than showing some significant shift in the wintering area. Regular wintering of Red-breasted Goose in small numbers (up to 90 birds) was recorded also in Hungary since 1972 (Madsen *et al*. 1999). Furthermore, an increase in the wintering population could be attributed to the larger effort: more birdwatchers and use of better research equipment, particularly spotting scopes.

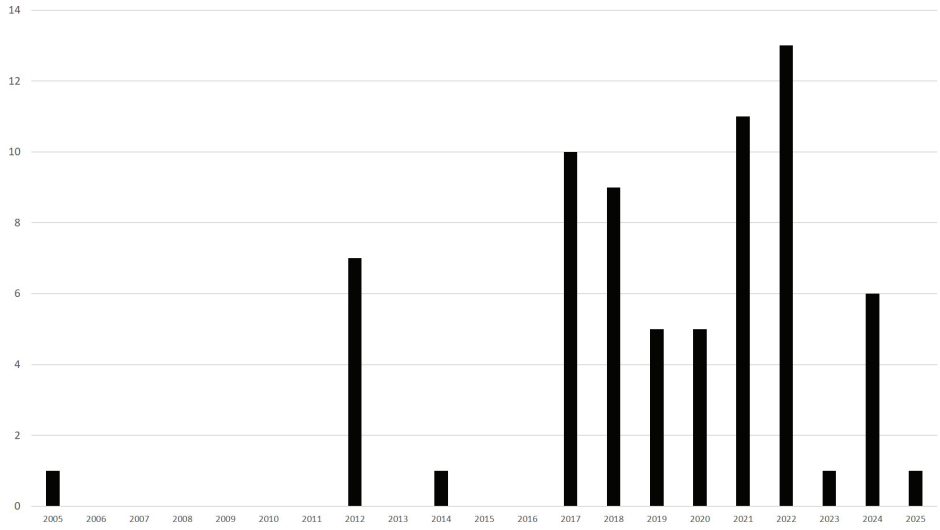


Figure 6. Numbers of Red-breasted Goose *Branta ruficollis* wintering in Croatia since 2005.
Slika 6. *Brojnost zimujuće populacije crvenovrate guske Branta ruficollis u Hrvatskoj*

Lesser White-fronted Goose *Anser erythropus*

It is a rare and irregular wintering species in Croatia. By 1983, only three records were known from the Mediterranean part of Croatia – single individuals were shot near the Cetina River and Delta of the Neretva River and one observation of a flock at Splitsko polje without any further evidence (Mikuska & Kutuzović 1982). Out of these three, only the record from Delta of Neretva was accepted by the Croatian Rarities Committee (Kralj & Radović 2002). During the period 1999-2022, the Lesser White-fronted Goose was occasionally reported during IWC, e.g., in 1999 (17 individuals), 2001 (6), 2005 (2), 2019 (1) and 2021 (1), but those observations were not accepted by the Croatian Rarities Committee

due to lack of evidence and reporting (Croatian Rarities Committee, *pers. comm.*). As a consequence, by 2025 only 3 valid and accepted records for Croatia exist, the latest being from 2022 at Eblin pastures in Kopački rit Nature Park (Barišić *et al*. 2016, Tomik & Barišić 2024).

Pink-footed Goose *Anser brachyrhyncus*

It is one of the rarest goose species in Croatia, with only four accepted records until 2016 (Barišić *et al*. 2016, Tomik & Barišić 2024). One individual was observed at the Pakra River in 1987 (Kralj & Radović 2002), one at the Crna Mlaka fishponds in 2003 (Kralj 2005), and one individual (two observations) in Mahovo, Lonjsko polje Nature Park during winter 2005/2006 (Kralj & Barišić 2013). During the period 1990-2022, the Pink-footed Goose was occasionally reported during IWC, e.g., in 1993 (1 individual) and 2006 (2 individuals), but those observations were not accepted by the Croatian Rarities Committee due to lack of evidence and proper reporting (Barišić *et al*. 2016).

Barnacle Goose *Branta leucopsis*

It is also a rare wintering species in Croatia. Until 2016, there was only one accepted observation of a single individual from 2010 at Podunavlje fishponds near Kopački rit wetlands (Barišić *et al*. 2016). Two individuals were observed and accepted during winter 2017, single individuals in 2019, 2021, and 2022, all in Kopački rit wetlands, and a single individual in 2022 at Donja Dubrava reservoir. During 2023, a single bird was observed at the Vransko Lake in the Mediterranean part, while four individuals were observed at Poljana fishpond and Banova Jaruga reservoir in 2024 (Tomik & Barišić 2024). All of them were observed among the wintering flocks of Greater White-fronted Goose. The increase in their observation rate in recent years can be attributed to a larger number of birdwatchers and the use of better research equipment.

Brent Goose *Branta bernicla*

It is the rarest goose species from the *Branta* genus, with only one accepted record – single bird was observed near Topolovac, Sisak in 1987 (Schneider 1989, Kralj & Radović 2002).

The three non-native geese species (Bar-headed Goose *Anser indicus,* Canada Goose *Branta canadensis* and Egyptian Goose *Alopochen aegyptiaca*) are only occasionally recorded during winter in Croatia. Until 2024, there were five accepted records of Bar-headed Goose, two of Canada Goose, and 13 of Egyptian Goose, respectively (Tomik & Barišić 2024).

Protection status of geese in Croatia

Out of all goose species occurring in Croatia, only two of them (Bean Goose and Greater White-fronted Goose) are on the list of hunting game (Official Gazette 94/2019), while Greylag Goose, Lesser White-fronted Goose and Red-breasted Goose are strictly protected according to the Nature Protection Act (Official Gazette 80/13, 15/18, 14/19, 127/19, 155/23). However, both game species are under permanent, year-long hunting ban provisions. Despite protection, wintering geese are subject to illegal hunting on fishponds (Mikuska *et al.* 2014) and persecution and harassment due to human-wildlife conflict related to agricultural production and grazing by the wintering flocks.

Acknowledgments

We would like to thank all birdwatchers who contributed to the IWC counts throughout the entire period.

REFERENCES

Barišić, S., Kralj, J., Jurinović, L. (2016): Rare birds in Croatia. The fourth report of the Croatian Birds Rarities Committee. Larus 51: 38-56.

Kapelj, S., Radović, A., Zec, M., Mihelič, T., Mikac, S., Maslać Mikulec, M., Patčev, E., Dender, D., Taylor, L., Mikuška, T., Budinski, I. (2023): Završno izvješće Usluge definiranja SMART ciljeva očuvanja i osnovnih mjera očuvanja ciljnih vrsta i stanišnih tipova - Grupa 5: Definiranje ciljeva i mjera očuvanja za nedovoljno poznate vrste ptica, Udruga BIOM, Geonatura, DOPPS, Zagreb. 36 p. (in Croatian)

Keve, A., Mikuska, J. (1973): Podaci o zimskoj populaciji guske glogovnjače *Anser fabalis*, iz sjeverne Jugoslavije i Mađarske. Larus 25: 47-53. (in Croatian)

Kralj, J., Radović, D. (2002): Rare birds in Croatia (1st Report of the Croatian Birds Rarities Committee). Larus 48: 73-83. (in Croatian)

Kralj, J. (2005): Rare birds in Croatia (2nd Report of the Croatian Birds Rarities Committee). Larus 49: 37-51. (in Croatian)

Kralj J., Barišić S. (2013): Rare birds in Croatia. Third Report of the Croatian Birds Rarities Committee). Natura Croatica 22: 375-396.

Lebret, T. (1982): Goose observation in the Pannonic region in October-December 1980 and in March 1981. Aquila 89: 187-191.

Madsen, J., Cracknell, G., Fox, T. (1999): Goose Populations of the Western Palearctic. A review of status and distribution. Wetlands International Publication no. 48. National Environmental Research Institute, Denmark.

Mikuska, J. (1973): Rasprostranjenost i veličina populacije guske divlje, *Anser anser*, u Jugoslaviji. Larus 25: 55-60. (in Croatian)

Mikuska, J., Kutuzović, B. (1982): Geese in Yugoslavia. IWRB symposium on "Population ecology of Geese", Debrecen, Hungary. Aquila 89: 195-204.

Mikuska, J., Mikuska, T. (1992): Results of mid-winter waterfowl counts in Croatia in 1987. Troglodytes 5: 21-62. (in Croatian)

Mikuska, J., Mikuska, T. (1993): Results of mid-winter waterfowl counts in Croatia during 1988. Troglodytes 6: 55-93. (in Croatian)

Mikuska, J., Mikuska, T. (1994): Results of mid-winter waterfowl counts in Croatia during 1989. Troglodytes 7: 15-54. (in Croatian)

Mikuska, J., Mikuska, T. (1995): Results of mid-winter waterfowl counts in Croatia during 1990. Troglodytes 8: 13-50. (in Croatian)

Mikuska, A., Horvat, D., Tomik, A., Mikuska, T. (2014): Impact of hunting on strictly protected species in Croatia. Proceedings from 2nd Adriatic Flyway Conference: Adriatic Flyway - Bird Conservation on the Balkans, Durres, Albania, 45-51.

Novoselac, M. (2011): Zimovanje ptica močvarica u Hrvatskoj od 2009. do 2011. godine. Diplomski rad, Odjel za Biologiju, Sveučilište Josipa Jurja Strossmayera u Osijeku. 77 p. (in Croatian)

Radović, D., Kralj, J., Tutiš, V., Ćiković, D. (2003): Red Data Book of Birds of Croatia. Ministry of Environmental Protection and Space Planning, Zagreb. (in Croatian)

Rakitić, A. (2020): Značajni lokaliteti za zimovanje ptica močvarica u Hrvatskoj od 2017. do 2019. godine. Diplomski rad, Odjel za Biologiju, Sveučilište Josipa Jurja Strossmayera u Osijeku. 86 pp. (in Croatian)

Schneider, M. (1989): Endangered and rare birds in the alluvial wetlands of the Sava River on the Posavina/Croatia. Larus 40: 167-178.

Tomik, A., Barišić, S. (2024): Rare birds in Croatia. The fifth report of the Croatian Birds Rarities Committee. Larus 59: 137-152.

Tutiš, V., Kralj, J., Radović, D., Ćiković, D., Barišić, S. (2013): Red Data Book of Birds of Croatia. Ministry of Environmental and Nature Protection and State Institute for Nature Protection, Zagreb. 258 p. (in Croatian)

SAŽETAK

Od 11 vrsta gusaka opaženih u Hrvatskoj (8 divljih i 3 potencijalno odbjeglim iz zarobljeništva) samo dvije redovito zimuju: siva guska *Anser anser* i lisasta guska *Anser albifrons*. Na temelju podataka zimskog prebrojavanja ptica močvarica (IWC, 1999.-2025.) obje vrste imaju rastući trend u brojnosti zimujućih jedinki. Njihova glavna zimovališta nalaze se u sjevernom, panonskom dijelu Hrvatske. Divlja guska zimuje u prosjeku s 9502 (min = 1994., max = 34.116), a velika lisasta guska u prosjeku s 10.404 (min = 324, max = 30.959) jedinki.

Guska glogovnjača *Anser fabalis* je u Hrvatskoj bila redovita zimovalica do 2017. godine (min = 11, max = 16.679, ali i do 30.000 u 1988./1989.), ali je smanjenje njihove populacije započelo je već krajem 20-tog stoljeća kao posljedica pomicanja njihovih zimovališta sjevernije od Panonske nizine.

U prošlosti je crvenovrata guska *Branta ruficollis* bila vrlo rijedak zimski gost, ali je od 2012. godine počela gotovo redovito zimovati u malom broju (1-11 jedinki). Mala guska *Anser erythropus* (1-17 jedinki), kratkokljuna guska *A. brachyrhyncus* (do 2 jedinke), bjelolica guska *Branta leucopsis* (1-2 jedinke) i grivasta guska *Branta bernicla* su i dalje rijetki

zimski posjetitelji u Hrvatskoj. Indijska guska *Anser indicus* (1-6 jedinki), kanadska guska *Branta canadensis* (pojedinačne jedinke) i egipatska guska *Alopochen aegyptiaca* (1-3 jedinke) smatraju se stranim i odbjeglim pticama iz zarobljeništva koje se povremeno bilježe u malom broju.

Glavna zimovališta gusaka nalaze se u sjevernoj Hrvatskoj uz rijeke Dunav, Savu i Dravu i njihove poplavne doline, kao i na velikim ribnjacima koji im pružaju zaklon od kuda lete na područja za ishranu na obližnjim poljoprivrednim poljima. Mediteranski dio Hrvatske je u potpunosti izgubio svoju važnost za zimujuće guske zbog globalnog zatopljenja i posljedično blažih zima u sjevernim dijelovima Hrvatske, Panonskoj nizini i srednjoj Europi.